GEOLOGIC MAPPING AND HISTORY OF THE OVDA REGIO QUADRANGLE (V-35), VENUS

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The Ovda Regio quadrangle (V-35), Venus, is a geologically complex region that has been exposed to many episodes of volcanism and deformation interspersed through time. It is host to a variety of geomorphic features including portions of two crustal plateaus (eastern Ovda and western Thetis), Inari and other coronae, numerous small volcanic edifices, impact craters, large flows, and Kuanja Chasma (fracture zone). With the exception of plains material (non-existent), V-35 contains examples of nearly every geologic featured observed on Venus. Utilizing the mapping methodology outlined in Hansen [1], a geologic history of the V-35 quadrangle is proposed.

Mapping indicates that tesserae, whether as part of a crustal plateau or as an isolated inlier, locally represents the oldest deformed crust. Within the tesserae of eastern Ovda, a radial pattern of shear fracture ribbons represents early extension, and a set of semi-concentric marginal folds are cut by late forming grabens [2,3]. The kinematic history (early extension, followed by contraction and further extension) represented by the structures within Ovda supports an upwelling model for crustal plateau formation. Similar structural relations and patterns are observed in the tesserae of Thetis. The two, distinct, coherent sets of structures strongly suggest that the tesserae of Ovda and Thetis did not form in the same deformational event, but rather were the result of a similar process operating independently at each location.

After formation of the tessera structures, volcanism is seen in the form of Intra-Tessera-Basin (ITB) lava fill [4]. ITB lava indiscriminately fills both small- and large-scale structural depressions in Ovda and Thetis. Banks et al. and Hansen et al. have studied other ITB's and have shown that volcanism is an important process throughout crustal plateau construction [4,5]. More detailed study of Ovda and Thetis ITB's is required to make a robust comparison to the ITB's of other authors. In addition to ITB's within the crustal plateau, volcanism is present on the flanks and surrounding the crustal plateaus. These materials are found primarily on the slopes and at the bases of crustal plateaus. Lavas, originating from sources within the crustal plateau, converge and follow localized paths until they spill over the slope of a crustal plateau coalescing into regional topographic depressions.

The remainder of the geologic history is dominated by localized volcanic flows, either originating from corona, shield fields, or fissures. Very large flows emanate from Inari Corona in the southeast and flow to the west, whereas Ovda Fluctus and corona cluster volcanism dominate in the west. The relative timing of these events is difficult to determine since there are no direct embayment relations.

Pervasive east-west fracturing, associated with the Kuanja Chasma, cuts most material units and dominates the recent history of V-35. In addition to a major episode of deformation, the Kuanja Chasma is a minor source of surface volcanism in the form of fissure-fed flows.

References: [1] Hansen, V.L., 2000, Earth and Planetary Science Letters, v. 176, p. 527-542. [2] Ghent, R.R. and Hansen, V.L., 1999, Icarus, v. 139, p. 116-136. [3] Bleamaster, L.F. and Hansen, V.L., 2000, LPSC XXXI, #1788. [4] Banks, B.K. and Hansen, V.L., 2000, J. Geophys. Res. (in press). [5] Hansen, V.L., Banks, B.K., and Ghent, R.R., 1999, Geology, 27, p. 1071-1074.